New Specification

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Double Award Science: Physics

GDW31

Unit P1
Foundation Tier

[GDW31]

FRIDAY 23 FEBRUARY 2018, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **8(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

Examiner Only	
Marks	Remark

1 **(a)** Many devices change energy from one form to another. Complete the boxes below to show the main energy change which each device is **designed** to bring about.

(i) Electric toaster

electrical energy	→	energy

© *mipan / iStock / Thinkstock*

[1]

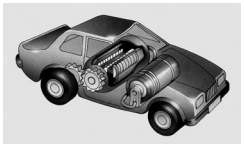
(ii) Candle

energy	→	***heat*** and energy

© *naotoshinkai / iStock / Thinkstock*

[2]

(iii) Electric motor in toy car



electrical energy	→	energy

© *Ricky Blakeley / Thinkstock*

[1]

(b) Coal is a non-renewable energy resource.

Explain what is meant by the term non-renewable energy resource.

_____

_____ [1]

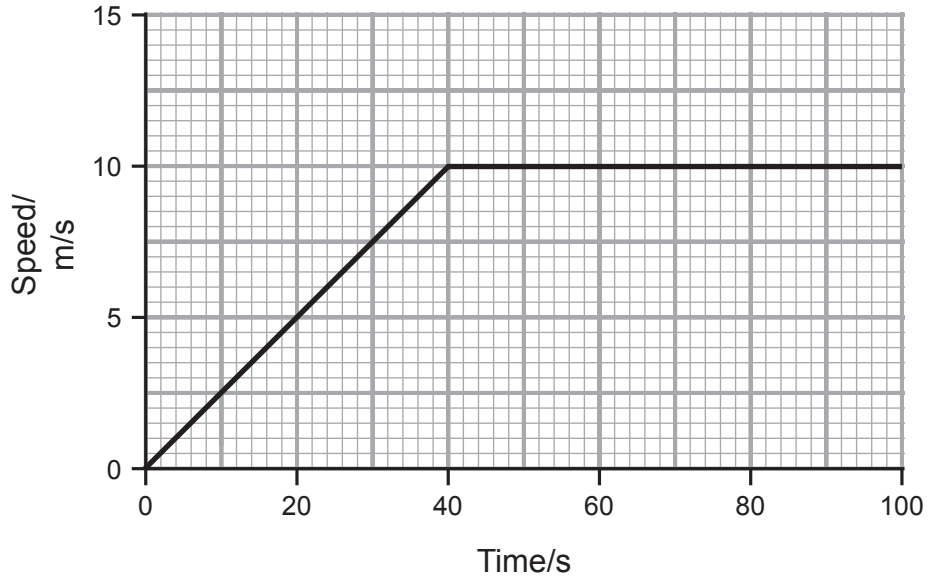
(c) Give two examples of **renewable** energy resources.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

2 The graph of speed against time for a train is shown below.



(a) (i) Describe the motion of the train for the first 40 seconds.

_____ [1]

(ii) Describe the motion of the train from 40 seconds to 100 seconds.

_____ [1]

(b) Use values from the graph to calculate the average speed of the train over the first 40 seconds.

You are advised to show your working out.

Average speed = _____ m/s [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 An astronaut is making repairs to a spacecraft and accidently releases a spanner which then moves away from him into space.

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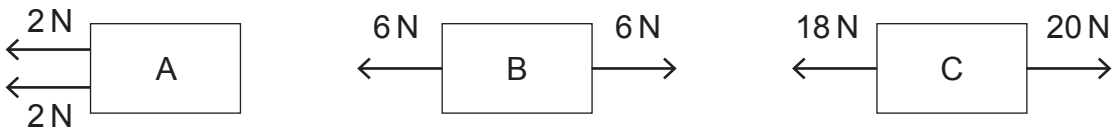
(a) Assuming **no forces** act on the spanner, describe fully how Newton's first law predicts that the spanner will move.

_____

_____ [2]

The objects shown below all have the same mass. Forces act on the objects as shown.



(b) **(i)** Which object, A, B, or C, could be at rest?

Object _____ [1]

(ii) Which object, A, B, or C, will have the biggest acceleration?

Object _____ [1]

(iii) Which object, A, B, or C, could be moving at constant speed?

Object _____ [1]

4 A knife can be used to cut an apple.

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(a) Complete the following.

It is easier to cut an apple with a sharp knife because the area of the cutting edge of the blade is _____ and this creates a _____ pressure. [2]

Examiner Only	
Marks	Remark

(b) Lizards that live in hot countries lift their feet in turn in order to keep the time each foot is in contact with the hot ground as small as possible.

Examiner Only	
Marks	Remark

© Jupiterimages / PHOTOS.com / Thinkstock

A lizard weighs 6 N and **each** of its feet has an area of 1.5 cm^2.

Calculate the pressure the lizard exerts on the ground when it is standing on **two** feet.

You are advised to show your working out.

Pressure = _____ N/cm^2 [3]

5 Silver can be used to make jewellery.

© Reid K Dalland / iStock / Thinkstock

(a) A solid piece of silver has a mass of 42 g and a volume of 4 cm^3.

Calculate the density of the silver and include its unit with your answer.

You are advised to show your working out.

Density = _____ [4]

Examiner Only	
Marks	Remark

(b) Use your knowledge of the kinetic theory to answer the following questions about the arrangement of particles in solids, liquids and gases. Choose your answer by placing a tick (✓) in the correct box.

Examiner Only	
Marks	Remark

(i) The particles in a liquid are:

- closer than in a solid; ☐
- slightly further apart than in a solid; ☐
- very much further apart than in a solid. ☐

(ii) The particles in a gas are:

- approximately the same distance apart as a liquid; ☐
- slightly further apart than in a liquid; ☐
- much further apart than in a liquid. ☐

(iii) The particles in a solid are:

- closer than in a liquid or gas; ☐
- closer than in a liquid but further apart than in a gas; ☐
- further apart than in a liquid but closer than in a gas. ☐

[3]

(c) Arrange solids, liquids and gases in order of **increasing** density.

Increasing density →

_____ _____ _____

[1]

6 A monkey climbs a tree.

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(a) The monkey has a mass of 2.5 kg. Calculate the potential energy of the monkey when it is at a height of 12 m.

You are advised to show your working out.

Potential energy = _____ J [3]

(b) Another monkey does 8000 J of work climbing a tree. Calculate the power developed by the monkey if it takes 40 s to climb the tree.

You are advised to show your working out.

Power = _____ W [3]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

Examiner Only	
Marks	Remark

7 Matter is made up of protons, neutrons and electrons.

(a) Complete the table below to show the location of each particle in an atom.

Particle	Location
Proton	
Neutron	
Electron	

[3]

Some nuclei are said to be radioactive and emit radiation.

(b) **(i)** Why are the nuclei radioactive?

_____ [1]

Two types of radiation emitted are alpha and beta.

(ii) Name the particles that make up an alpha particle.

_____ [1]

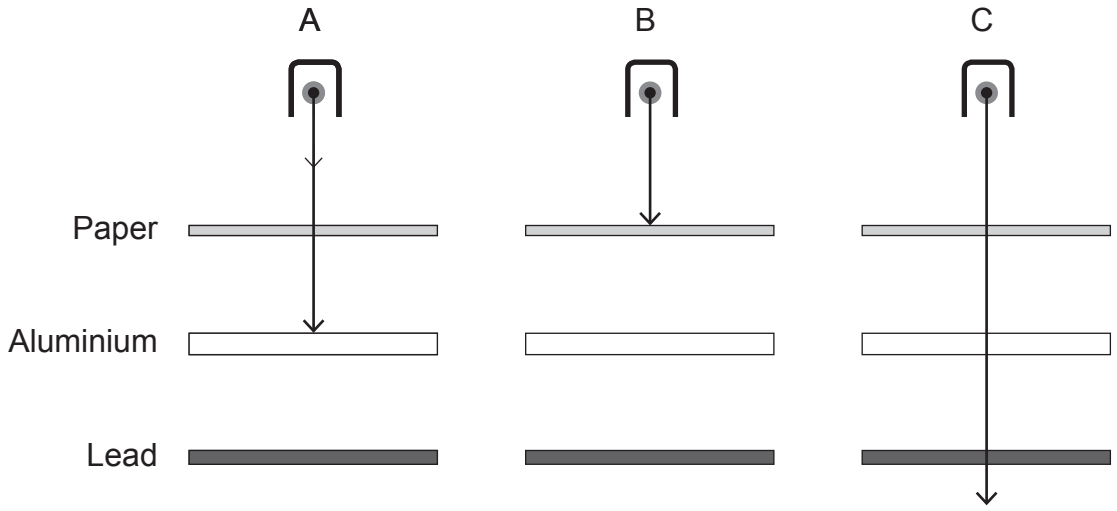
(iii) What is a beta particle?

_____ [1]

Three unknown radiations, A, B and C, have different penetrating abilities.

Examiner Only	
Marks	Remark

(c) Study the diagrams below and identify the type of radiation being emitted by the source in each case.



Source A is _____

Source B is _____

Source C is _____ [3]

Examiner Only	
Marks	Remark

8 **(a)** This is a question about a Hooke's Law investigation.
You are supplied with a spring and a number of masses in kg.

State:

- how you would calculate the applied force;
- what measuring instrument you would need to find the extension;
- the measurements you would take and how you would use them to find the extension;
- the graph you would expect to see if you plotted applied force against extension.

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

Calculate the applied force.

Measuring instrument to find extension.

Finding the extension.

The graph you would expect to see.

[6]

A helical spring has an unextended length of 200 mm. A load of 3 N produces an extension of 9 mm.

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(b) Calculate the total length of the spring when an **additional** 2 N is added to the spring.

You are advised to show your working out.

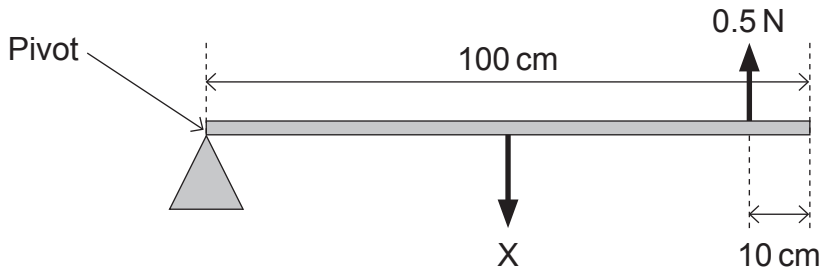
Total length of spring = _____ mm [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 A uniform metre rule is held in a horizontal position by exerting a vertical force of 0.5 N as shown.



(i) A force X acts downwards at the mid-point of the ruler. Name this force.

_____ [1]

(ii) What name is given to the mid-point of the metre rule?

_____ [1]

(iii) Use the Principle of Moments to calculate the force X.

You are advised to show your working out.

Force X = _____ N [4]

THIS IS THE END OF THE QUESTION PAPER

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